



XP-008004048

## FOC/LAN '88

## CSI Methods for Specifying Telecommunications Systems

William F. Riesberg

Construction Spec. Institute

Charleston, SC

This paper is comprised of two parts. Part I is an overview of the Construction Specifications Institute (CSI) and its philosophy, services and publications. Part II is an illustration of one of CSI's most valuable tools -- MASTERFORMAT. Through an example relating to the telecommunications industry, we'll discover how useful this tool is for organizing construction specifications.

**PART I:**  
**AN OVERVIEW OF THE CONSTRUCTION**  
**SPECIFICATIONS INSTITUTE.**

CSI is an organization that is comprised of individuals that make up every facet of the construction industry. It's unique membership is open to design professionals, contractors, material suppliers, manufacturers and others that are interested in the "Advancement of Construction Technology," CSI's motto.

As a member of the construction industry, today's professionals must deal with a complex web of legal documents, contracts, drawings, specifications, and product orders. Getting this paperwork under control often seems as much of an effort as the construction itself.

On a given project, scheduling personnel, materials, approvals, change orders, and inspections is one of the biggest challenges we face in our industry. In addition, buildings must meet intricate technological, environmental, legal, and financial requirements that can change between the initial concept and completion of the project.

At the very heart of CSI's efforts has been its dedication to organizing the myriad of documents that daily besiege those involved in the industry. Accurate communication and up-to-date information are essential to sound construction.

Getting someone to help you get this information in the relentless battle that constitutes modern commercial construction is a challenge that starts even before the first idea is drafted on paper. CSI provides this help -- help that is solid, accurate, professional and current. That's why CSI proudly declares that it is committed to the "Advancement Of Construction Technology" through communication, education, research, and service.

CSI was founded in 1948, when a small group of government officials recognized the need for a common system of organizing construction documents. Since then, CSI has grown to more than 19,000 members. The Institute boasts more than 130 chapters in 10 regions across the United States, as well as many members throughout the world.

But organizing construction documents is only a part of CSI's role today. Its members form an indispensable network of people in construction who exchange information and discuss issues affecting today's construction practices.

At the core of CSI are the chapters, where ideas and decision-makers mix, where products are reviewed, and your concerns are addressed. Your questions find answers through speakers, product shows, seminars, and discussions with fellow members.

Another forum for technical issues is the Construction Specifier, CSI's monthly magazine. It is devoted to non-residential construction, management ideas, legal issues, building products, and systems technology. Its advertising brings you "up-to-speed" on current products, systems, and literature. The articles in the Specifier often reflect the work of CSI's technical program--the heart of the Institute's commitment to the construction industry.

From the beginning, CSI dedicated itself to developing a standardized system for the format and arrangement of construction specifications. This was essential in order for one party of the construction team to communicate with another. In 1964, from that dedication, came the CSI format for construction specifications -- the first workable, professional, standardized format for organizing bidding requirements: contract forms, conditions of contract, and specifications. For the first time, participants in the construction process had a common language, a vehicle for getting project documents coordinated. Today we know it as MASTERFORMAT, established as part of CSI's Manual Of Practice. MASTERFORMAT serves as a comprehensive reference for the preparation, organization, and coordination of construction documents.

CSI's contributions to the construction industry didn't end with the Manual Of

Practice and MASTERFORMAT. Since 1967, CSI has published Spec-Data, a unique product data system for presenting technical product information. Available on microfilm, SPEC-DATA II enables specifiers and contractors to compare and evaluate construction products. In addition, there is the MANU-SPEC program, a companion to the SPEC-DATA program, which incorporates a series of proprietary specifications on manufacturers' products and systems. They are united by being written in the CSI language and format.

SpecText was introduced at the Institute's annual convention in 1979. This Master Guide Specification, available either in hard copy, or on magnetic media, enables the specifier to produce concise and coordinated specifications rapidly.

In addition, there is SpecGuide, the newest member of the CSI library of technical documents. It is a comprehensive reference and workbook for writing and coordinating the technical specification sections of a project manual -- the overall compilation of the construction documents for a project.

Each year CSI also publishes monographs that discuss, in detail, such specialized topics as finish hardware, roofing systems, and elevators. One hundred recent titles include ceramic tile, access flooring, fire sprinkler systems, and reroofing specifications.

CSI also is a member of the Engineers' Joint Contract Documents Committee. Working with ACEC, ASCE, and NSPE, CSI publishes standard contract document forms, forms that reflect current practices in construction administration in a language that is fair to all construction industry participants.

CSI's role is to draw together specifiers, architects, engineers, contractors, product manufacturers, and other industry associates to work side by side to provide information and guidance for each other and for the construction community in the organization and development of construction documents.

CSI has created the Certified Construction Specifier program for those individuals who prepare construction documents. This program tests the expertise of a specifier. Having "CCS" behind one's name identifies the specifier as someone who has demonstrated knowledge, ability, and experience in the preparation of construction documents. For those individuals who are not directly involved in the preparation of construction documents but who must read and interpret a construction project manual, CSI has developed the Certificate Program. This program promotes a common understanding of construction documents. This may be a vendor of construction products or systems, a management consultant, or anyone who must use, not prepare, the construction documents. Communicating project requirements with someone who can effectively read and interpret construction documents is easier and more effective.

Part of being a specifier goes beyond writing specifications. It involves fundamental techniques such as word processing, data manipulation, and data retrieval. An individual without these tools today will soon find that he is non-competitive. The electronic revolution has indeed affected the construction industry. CSI is advancing this by exploring ways to use electronic media to the benefit of the entire industry. For instance, the Naval Facility Engineering Command and the U.S. Army Corps of Engineers' Guide Specification libraries are now available. Through CSI data services, these libraries are converted to electronic formats compatible with most personal computers and word processors. They are available in hard copy and diskettes.

CSI is committed to directing the resources of its members to meet the challenge of the future. In an industry dominated by technology, innovation, and inventiveness, CSI is truly a leader.

## PART II: MASTERFORMAT -- A TOOL FOR SPECIFYING TELECOMMUNICATIONS SYSTEMS

Since its introduction, the sixteen-division format for construction specifications has gained acceptance as an industry standard in both the United States and Canada. It was initially published as a part of the "CSI Format for Construction Specifications" in 1963 and subsequently for the "Uniform System for Construction Specifications, Data Filing & Cost Accounting - Title One, Buildings" in 1966. The "Uniform System" was the result of a joint effort by construction industry professional and trade organizations in the United States. A similar effort in 1966 was being carried out in Canada, the result of which was "The Building Construction Index" (BCI). The U.S. and Canadian efforts were merged into a single document with the publication of the "Uniform Construction Index" (UCI) in 1972. The result was a comprehensive framework for organizing information contained in project manuals for construction as well as establishing a basis for data filing and project cost classification.

In 1978, Construction Specifications Canada joined with the Construction Specifications Institute to update the unified numerical reference concept. The result was MASTERFORMAT. This document incorporated the complete CSI organizational format for the project manual by including Bidding requirements, Contract Forms, and Conditions of the Contract in addition to the sixteen-division format for Specifications.

Since 1978, MASTERFORMAT has extended the acceptance previously gained by the format under Uniform System, BCI, and UCI to include the numerical classification system both in the United States and Canada.

In the United States, MASTERFORMAT has been adopted as an Industry Standardization

Document by the Department of Defense and is reflected in the development of Construction Guide Specifications prepared under the aegis of the Federal Construction Council.

Recognition and acceptance at the national levels has been supported by acceptance at state and municipal levels in the U.S. Industry acceptance is evidenced by the incorporation of the basic system provided by MASTERFORMAT into construction programs such as the coding of product literature and the organization of construction-related bid processing systems. The numerical classification system has been used as the basis for commercially marketed cost estimating systems, as well as as cost accounting methods used by contractors.

Most guide and project specifications for building construction produced today are based on MASTERFORMAT number and titling system. In addition to its use as the basis for numbering and titling Federal Construction Guide Specifications, MASTERFORMAT framework is used by SPECTEXT, as produced by the Construction Sciences Research Foundation, the research affiliate of CSI, as well as other commercially-marketed master guide specifications.

In the fifteen years since its introduction, practical experience in the application of MASTERFORMAT by a variety of users has suggested that some changes are occasionally needed to better suit the needs for specification writing, technical data filing, and project cost classification.

In order to make the format better suited to engineering projects, the format was revised in 1978 to address the then-present and future importance of engineering in our buildings.

MASTERFORMAT is on a five-year review cycle in order to keep in balance its responsiveness to the needs of industry, while giving the document reasonable stability so that users' systems aren't in a state of constant change. This year MASTERFORMAT will be revised. CSI has incorporated many of the changes recommended by the Electronic Industry Association Committee EIA TR-41.8.3 (Commercial) Building Telecommunications Architecture Working Group into the 1988 edition.

A project manual is comprised of four distinct parts:

- Bidding Requirements\*
- Contract Forms\*
- Conditions of the Contract\*
- Specifications (Divisions 1-16)

(\*These are referred to as "Documents" in lieu of "Sections")

Each Section or Document is given a unique five digit number to aid in locating the document in the project manual and to produce a uniform location for similar information. These numbers are based on MASTERFORMAT. For example, the first two digits of Section 16100

indicate the Division that the Section is located in, and the last three designate the address for the specific section.

One of CSI's fundamental precepts is to 'Say it once, say it right.' This principle is a great aid to reducing conflicts within documents, especially those made by last minute changes. This principal pervades MASTERFORMAT and is manifested in its very structure.

Let's take a look at the MASTERFORMAT as it relates to specifying a telecommunication system. Let's say we're a consultant designing a PBX system for a new corporate office building and let's see what Sections and Documents we need to use or coordinate.

First, we'll need to take a look at the Bidding and Contractual Requirements for the project. These are located at the beginning of the Manual in the Bidding and Contractual part. These documents control all of the specification Sections that follow them. Let's dissect that seemingly awesome 'front-end.'

#### Bidding Requirements, Contract Forms, and Conditions of the Contract.

00010	Pre-Bid Information
00100	Instructions to Bidders
00200	Information Available to Bidders
00300	Bid Forms
00400	Supplements To Bid Forms
00500	Agreement Forms
00600	Bonds And Certificates
00700	General Conditions
00800	Supplementary Conditions
00850	Drawings and Schedules
00900	Addenda And Modifications

That no longer looks quite as formidable as it did before, so let's look at what we're probably most interested in -- the technical side of the Project Manual -- the Specifications. Most of our coordination efforts (since we're a consultant on this project) will be focused on Division 1. Our technical work will be concerned with Division 16 - Electrical.

#### The 16 Specification Divisions of MASTERFORMAT

Division 1	General Requirements
Division 2	Sitework
Division 3	Concrete
Division 4	Masonry
Division 5	Metals
Division 6	Wood and Plastics
Division 7	Thermal and Moisture Protection
Division 8	Doors and Windows
Division 9	Finishes
Division 10	Specialties
Division 11	Equipment
Division 12	Furnishings
Division 13	Special Construction
Division 14	Conveying Systems
Division 15	Mechanical
Division 16	Electrical

We'll need to coordinate (or define if we're the prime engineer) the administrative requirements for the project. This is the job of Division 1 - General Requirements. The administrative requirements are put in one place so that the entire project manual is consistent, and duplicate or mutually exclusive or redundant statements are avoided. For instance, we'll want all submittals to have the same format, regardless of what section we're reviewing.

#### DIVISION 1 - GENERAL REQUIREMENTS

01010	Summary of Work
01020	Allowances
01025	Measurement and Payment
01030	Alternates/Alternatives
01040	Coordination
01050	Field Engineering
01060	Regulatory Requirements
01070	Abbreviations and Symbols
01080	Identification Systems
01090	Reference Standards
01100	Special Project Procedures
01200	Project Meetings
01300	Submittals
01400	Quality Control
01500	Construction Facilities and Temporary Controls
01600	Material and Equipment
01700	Contract Closeout
01800	Maintenance

Our technical work will be focused in Division 16 - Electrical. Section 16010 and 16050 are sections developed to deal with repetitive materials that are used in all electrical work or for more than one section. Again, 'Say it once...' An example would be conduit--The same conduit may be specified for several systems, without needless duplication that leads to inevitable error.

#### DIVISION 16 - ELECTRICAL Broadscope Section Titles

16010	Basic Electrical Requirements
16050	Basic Electrical Materials and Methods
16200	Power Generation - Built-Up Systems
16300	Medium Voltage Distribution (601-35,000 Volts)
16400	Service and Distribution (600 Volt and Below)
16500	Lighting
16600	Special Systems
16700	Communications
16850	Electric Resistance Heating
16900	Controls
16950	Testing

Looking closer, we can see that we'll want to take advantage of consolidating repetitively used materials into one location. The following is a listing of the first two broadscope Sections of Division 16, as broken down to their mediumslope and narrow cope levels.

16010	<b>Basic Electrical Requirements</b> This section includes basic requirements peculiar to Division 16 and common to more than one section of Division 16. If used, this section should supplement, but not repeat, general requirements included in Division 1 that are common to more than one division.
-------	--

16050	<b>Basic Electrical Materials and Methods</b>
-060	Minor Electrical Demolition for Remodeling
-110	Raceways Cable Trays Conduits Surface Raceways Indoor Service Poles Underfloor Ducts Underground Ducts and Manholes Wires and Cables Low Voltage Wire 600 Volt or Less Wire and Cable Medium Voltage Cable Boxes Floor Boxes Outlet Boxes Pull and Junction Boxes Wiring Devices Low Voltage Switching Cabinets and Enclosures Equipment Wiring Systems Supporting Devices Electrical Identification
-120	
-130	
-140	
-160	
-180	
-190	
-195	

For the actual technical section we want to specify, Broadscope Section 16700 seems to fit the bill, but it doesn't go deep enough because we have several types of communications systems on this project. Let's look closer. Section 16700 is subdivided into 'Mediumscope' and, if required, 'Narrowscope'. Section titles if several systems are needed. The exact numbers for the last three digit are left to the discretion of the specification writer. For instance if we had both PBX and Facsimile (FAX) Systems, we would need two separate numbers such as 16742 and 16745.

16700	<b>Communications</b> Equipment and Installation of systems used in detection access control, and audio/visual signal systems
-720	Alarm and Detection Systems Fire Alarm Systems Intrusion Detection Systems Security Access Systems Smoke Detection Systems Clock and Program Systems Telephone Systems PBX Systems Centrex Systems Shared Tenant Systems Facsimile (FAX) Systems Cellular Systems Paging Systems Call Systems Data Systems Local Area Network Systems Door Answering Systems Microwave/Radio Systems Central Dictation Systems
-730	
-740	
-750	Nurse Call Systems
-760	Intercommunication Systems
-770	Public Address Systems
-780	Television Systems Master Antenna Systems Video Telecommunication Systems (2 way) Surveillance Systems (1 way) Broadcast Systems

That's basically the concept behind MASTERFORMAT. I hope you can see its usefulness of application for the telecommunications industry.